**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): Apparatus for performing chemical assays involving aqueous fluids, the apparatus comprising:

at least one reaction chamber;

at least one fluid inflow channel having an inner end communicating with the reaction chamber and an outer end communicating with an exterior of the apparatus for receiving a deposited drop of aqueous fluid upon which an assay is to be performed; and

gate means ~~adapted to prevent~~ for preventing passage of aqueous fluid through the fluid inflow channel into the reaction chamber, until such fluid is acted upon by a fluid entry force;

wherein the gate means ~~comprises at least a portion of the fluid inflow channel having~~ is provided by a hydrophobic inner surface of the fluid inflow channel.

Claim 2 (original): Apparatus according to claim 1, wherein the reaction chamber comprises a microchannel having at least one dimension in the range 1 to 1,000$\mu$m.

Claims 3-8 (canceled).

Claim 9 (previously presented): Apparatus according to claim 66, wherein each reaction chamber is provided with a separate inflow channel.

Claim 10 (previously presented): Apparatus according to claim 66, wherein there is one inflow channel forming a common conduit to all reaction chambers.

Claims 11-14 (canceled).

Claim 15 (previously presented): Apparatus according to claim 71, comprising a plurality of said apparatuses mounted together on a tape.

Claim 16 (previously presented): Apparatus according to claim 67, further comprising a substantially circular substrate, wherein the microchannels being arranged substantially radially, each microchannel having its inflow channel towards the circumference of the substrate and its opposite end communicating with a central chamber connected to said aspiration means.

Claims 17-18 (canceled).

Claim 19 (original): Apparatus according to claim 16, wherein the circular substrate is rotatable, and the fluid entry force is provided by centrifugal pressure as the substrate is caused to rotate.

Claims 20-21 (canceled).

Claim 22 (previously presented): Apparatus according to claim 77, wherein the reservoir communicates with the reaction chamber via a normally closed valve, which may be caused to open by the application of increased pressure to the aqueous fluid within the cavity.

Claim 23 (original): Apparatus according to claim 22, further comprising a piston member having an outer profile shaped to fit within the cavity, the cavity being capped by a breakable seal, which, in operation, is broken by the piston, wherein movement of the piston into the cavity provides the increased pressure necessary to urge the aqueous fluid from the cavity via the valve into the reaction chamber.

Claim 24 (canceled).

Claim 25 (previously presented): Apparatus according to claim 78, wherein said conductive portion is formed of a conductive polymer material.

Claim 26 (previously presented): Apparatus according to claim 78, wherein said conductive portion is formed by an electrode.

Claim 27 (original): Apparatus according to claim 26, wherein said electrode is of a semiconductor material.

Claim 28 (original): Apparatus according to claim 27, wherein said semiconductor material is substantially transparent.

Claim 29 (original): Apparatus according to claim 28, wherein the semiconductor material is indium oxide.

Claim 30 (canceled).

Claim 31 (previously presented): Apparatus according to claim 79, wherein the detection means comprises at least one photodiode arranged along at least a portion of the reaction chamber.

Claim 32 (canceled).

Claim 33 (previously presented): Apparatus according to claim 82, wherein the reagent is selected from the group consisting of an oligonucleotide, a polypeptide, a protein, a natural molecule, and a synthetic molecule.

Claims 34-35 (canceled).

Claim 36 (previously presented): Apparatus according to claim 84, wherein the covalent bonding is achieved via a succinimide bonding agent.

Claim 37 (canceled).

Claim 38 (previously presented): Apparatus according to claim 85, wherein the crosslinker is polylysine.

Claims 39-40 (canceled).

Claim 41 (previously presented): Apparatus according to claim 87, wherein the substrate and overlying layer are formed of polymer materials, the melting point of at least one of the materials being sufficiently low to permit the substrate and overlying layer to be sealed together by thermal lamination.

Claim 42 (original): Apparatus according to claim 41, wherein said at least one material is polyethylene.

Claim 43 (canceled).

Claim 44 (previously presented): Apparatus according to claim 88, wherein the elastomeric material is polydimethylsiloxane (PDMS).

Claim 45 (canceled).

Claim 46 (previously presented): Apparatus according to claim 89, wherein the substantially opaque material comprises one of a carbon-filled polymer and a ceramics material.

Claim 47-53 (canceled).

Claim 54 (previously presented): A method according to claim 92, wherein the sample is caused to exit the reaction chamber before at least one of the reaction chamber and the expelled sample is monitored for at least one of the presence and concentration of a target substance.

Claims 55-57 (canceled).

Claim 58 (previously presented): A method according to claim 95, wherein the sample is expelled from the reaction chamber by spinning the substrate at a greater angular velocity, in the range 10 to 100,000 revolutions per minute, for a period of time in the range 1 to 100s.

Claim 59 (canceled).

Claim 60 (previously presented): Apparatus according to claim 1, wherein the fluid inflow channel is formed in a substrate at least a portion of which is composed of a hydrophobic material.

Claim 61 (previously presented): Apparatus according to claim 1, wherein the fluid inflow channel is formed in a substrate at least a portion of which is physically treated to render it hydrophobic.

Claim 62 (previously presented): Apparatus according to claim 1, wherein the fluid inflow channel is formed in a substrate at least a portion of which is chemically treated to render it hydrophobic.

Claim 63 (previously presented): Apparatus according to claim 1, wherein the fluid inflow channel has a cross-sectional area in the range $10\mu m^2$ to 1,000 $mm^2$.

Claim 64 (previously presented): Apparatus according to claim 1, wherein the fluid inflow channel is moulded to be complementary in shape to a standard pipette.

Claim 65 (previously presented): Apparatus according to claim 1, wherein the fluid entry force is provided by piston pressure.

Claim 66 (previously presented): Apparatus according to claim 1, comprising a plurality of separate reaction chambers, each communicating with an inflow channel and associated gate means.

Claim 67 (previously presented): Apparatus according to claim 66, wherein each reaction chamber comprises a microchannel having at least one dimension in the range 1 to 1,000$\mu$m, and wherein each microchannel communicates, at its end distal the inflow channel, with a common conduit, the common conduit being connected to aspiration means adapted selectively to apply reduced pressure to the conduit and thus to draw fluid through the microchannels in operation.

Claim 68 (previously presented): Apparatus according to claim 10, wherein the common conduit has a cross-sectional area in the range 0.01 $mm^2$ to 25 $cm^2$.

Claim 69 (previously presented): Apparatus according to claim 67, wherein the common conduit has a cross-sectional area in the range 0.01$mm^2$ to 25$cm^2$.

Claim 70 (previously presented): Apparatus according to claim 67, wherein the microchannels are arranged generally parallel to each other.

Claim 71 (previously presented): Apparatus according to claim 70, wherein the microchannels are arranged generally perpendicularly to the common conduit.

Claim 72 (previously presented): Apparatus according to claim 66, wherein each reaction chamber comprises a microchannel having at least one dimension in the range 1 to 1,000$\mu$m, and further comprising a substantially circular substrate, wherein the microchannels are arranged substantially radially, the inflow channel being disposed toward the center of the substrate, and each microchannel having a waste chamber its opposite end toward the circumference of the substrate.

Claim 73 (previously presented): Apparatus according to claim 16, wherein the thickness of the substantially circular substrate is in the range 50 to 5,000$\mu$m.

Claim 74 (previously presented): Apparatus according to claim 72, wherein the thickness of the substantially circular substrate is in the range 50 to 5,000$\mu$m.

Claim 75 (previously presented): Apparatus according to claim 70, comprising a plurality of said apparatuses disposed on a rotatable support member, and wherein the fluid entry force is provided by centrifugal pressure as the support member is caused to rotate.

Claim 76 (previously presented): Apparatus according to claim 71, comprising a plurality of said apparatuses disposed on a rotatable support member, and wherein the fluid entry force is provided by centrifugal pressure as the support member is caused to rotate.

Claim 77 (previously presented): Apparatus according to claim 1, wherein the reaction chamber is provided, proximate thereto, with a sealed cavity forming a reservoir filled with an aqueous fluid.

Claim 78 (previously presented): Apparatus according to claim 1, wherein at least a portion of the surface of the reaction chamber is formed of an electrically conductive material, and the apparatus further comprises electrical detection circuitry connected to said conductive portion, to enable detection of a target species within the reaction chamber by electrochemical means.

Claim 79 (previously presented): Apparatus according to claim 1, further comprising electromagnetic radiation detection means adapted to detect radiation emitted by a target species in the reaction chamber.

Claim 80 (previously presented): Apparatus according to claim 79, wherein the detection means comprises at least one photomultiplier array arranged along at least a portion of the reaction chamber.

Claim 81 (previously presented): Apparatus according to claim 1, wherein a chemical reagent is immobilised on at least a portion of the inner surface of the reaction chamber, the reagent being adapted to interact with a target species whose presence is to be determined.

Claim 82 (previously presented): Apparatus according to claim 1, wherein a chemical reagent is immobilised on at least a portion of the inner surface of the reaction chamber, the reagent being adapted to interact with a target species whose concentration is to be determined.

Claim 83 (previously presented): Apparatus according to claim 82, wherein the reagent is adsorbed onto said inner surface of the reaction chamber.

Claim 84 (previously presented): Apparatus according to claim 82, wherein the reagent is covalently attached to said inner surface of the reaction chamber.

Claim 85 (previously presented): Apparatus according to claim 82, wherein the reagent is electrostatically attached to said inner surface of the reaction chamber via a crosslinker.

Claim 86 (previously presented): Apparatus according to claim 1, wherein at least a portion of one of the inner surface of the reaction chamber and the fluid inflow channel is provided with chemically function groups formed by one of a chemical and a physical treatment of the surface.

Claim 87 (currently amended): Apparatus according to claim 1, further comprising a substrate ~~, in which~~ having a depression that defines at least one of the reaction chamber and the fluid inflow channel ~~is formed as a depression in the substrate~~, and ~~wherein the depression being sealed by an overlying~~ further comprising a layer ~~applied~~ that extends over the substrate and that seals the depressions.

Claim 88 (previously presented): Apparatus according to claim 87, wherein the overlying layer is formed of an elastomeric material.

Claim 89 (previously presented): Apparatus according to claim 87, further comprising electromagnetic radiation detection means adapted to detect radiation emitted by a target species in the reaction chamber, and wherein at least a portion of the substrate is formed of a substantially opaque material and the overlying layer is formed of a substantially transparent material.

Claims 90-91 (canceled).

Claim 92 (currently amended): A method of operating an apparatus for performing chemical assays involving aqueous fluids, comprising the steps of:

utilizing an apparatus having at least one reaction chamber, at least one fluid inflow channel <u>having an inner end</u> communicating with the reaction chamber <u>and an outer end communicating with an exterior of the apparatus</u>, and gate means adapted to prevent passage of aqueous fluid through the fluid inflow channel into the reaction chamber until such fluid is acted upon by a fluid entry force, the gate means ~~comprising at least a portion of the fluid inflow channel and having~~ <u>being provided by</u> a hydrophobic inner surface <u>of the fluid inflow channel</u>;

placing at least one sample of an aqueous solution under test at the <u>outer</u> end of the fluid inflow channel distal the reaction chamber;

causing the sample to enter the reaction chamber via the fluid inflow channel by applying a fluid entry force; and

monitoring the sample in the reaction chamber for one of the presence and concentration of a target substance.

Claim 93 (previously presented): A method according to claim 92, wherein the sample is applied by one of a pipette, a syringe, and an electrically operated injector.

Claim 94 (previously presented): A method according claim 92, wherein the apparatus has a plurality of separate reaction chambers each communicating with an inflow channel and associated gate means, wherein each reaction chamber comprises a microchannel which communicates at its end distal the inflow channel with a common conduit, wherein the

common conduit is connected to aspiration means, and wherein the fluid entry force is provided by said aspiration means, the aspiration means being activated to apply reduced pressure to each reaction chamber for a period of time in the range 0.1 to 100 seconds.

Claim 95 (previously presented): A method according to claim 94, wherein the apparatus has a substantially circular substrate, the microchannels are arranged substantially radially with respect to the substrate, and each microchannel having its inflow channel towards the circumference of the substrate and its opposite end communicating with a central chamber connected to said aspiration means; wherein the circular substrate is rotatable; and wherein the fluid entry force is provided by spinning the substrate at an angular velocity in the range 1 to 1,000 revolutions per minute for a period of time in the range 1 to 100 seconds.

Claim 96 (previously presented): A method according to claim 92, wherein the fluid entry force is provided by piston pressure.